



UNIVERSITY OF MAINE AT FARMINGTON
COLLEGE OF EDUCATION, HEALTH AND REHABILITATION

DIMENSION INTERSECTION
LESSON PLAN #5

Teacher's Name:

- Tracey Hollingsworth

Grade Six Topic:

- Students will analyze the effect of an intersection of a two-dimensional plane on a three-dimensional figure.

Objectives

- **Student will understand that** how technology can be used to explore, expand, and interpret mathematics in terms of art.
- **Student will know** that a two-dimensional plane can intersect a three-dimensional figure.
- **Student will be able to** analyze the effect of an intersection of a two-dimensional plane on a three-dimensional figure.

Maine Learning Results Alignment

MLR - Mathematics - Geometric Figures - 1.

Students represent solid figures in two dimensions.

MLR - Geometric Measurement - 3.

Students will understand how to use proportional relationships to make indirect linear measurements and use scale drawings to make their linear measurements.

MLR - Art - B. Creation, Performance, and Expression - Visual Arts - E2. The Arts & Other Disciplines.

Students explain skills and concepts that are similar across disciplines.

Rationale:

This lesson meets the Maine Learning Results in the content areas of Mathematics and Art. Students will be representing a three-dimensional building as a two-dimensional floor plan. The floor plans will be drawn to scale using the Floorplanner software. By understanding where mathematics is used in real world applications, students will accept the importance of mathematics.

Assessment

Formative Assessment for Learning

In the previous lessons of this unit, student will have learned the important properties and relationships between basic two- and three-dimensional figures, properties of solids and surfaces of three-dimensional figures such as prisms and cylinders, properties of three-dimensional figures such as pyramids, cones, and spheres, and that there are multiple views in three-dimensions that can be represented in two-dimensions. The understanding of these previous concepts is crucial to the success of this lesson. Students will be evaluated by observation and work sample. Students and I will be able to discuss any misunderstandings prior to creating their final product. After the class discussion and clarifying questions have been answered, students will start their final product for the lesson.

Summative Assessment of Learning

Students will understand the relationship between mathematics and architecture. Students will be representing a three-dimensional building as a two-dimensional floor plan. The floor plans will be drawn to scale using the Floorplanner software, which will also be used in an upcoming WebQuest.

Integration

Technology:

- Floorplanner

Other Content Areas:

- Art
 - Architecture applications
- Design & Layout:
 - Students will be creating a floor plan using www.floorplanner.com
 - Students will be representing problems visually.
- English
 - Students will be writing in their blogs and present an oral explanation of their mathematical work via class discussion and product presentation.
- History
 - Students will be revisiting the history of Math through years of ancient architecture.
- Science
 - Applications involving building materials.

Groupings

Cooperative Learning: Pair & Share

- **Pair:** Design the first floor of a building!
- **Share:** Share floor plans with the class.

Differentiated Instruction

Logical:

- Students will be representing a three-dimensional building as a two-dimensional floor plan. The floor plans will be drawn to scale using the Floorplanner software. By understanding where mathematics is used in real world applications, students will accept the importance of mathematics.

Verbal:

- Students will be participating in group and class discussions, and defending their art and mathematical work.

Visual:

- Students will analyze real world architecture by creating a geometrical representation using Floorplanner. They will use graphic organizers if necessary.

Musical:

- Music will be played while students are working on their final product.

Intrapersonal:

- Students will work individually during certain parts of the lesson and will be required to reflect on the class activities.

Interpersonal:

- Students will be involved in group-work.

Kinesthetic:

- Students will be moving around the classroom getting in/out of group formation.

Naturalist:

- Architecture creates the world around us, but is not limited to buildings. Students may choose objects in nature to draw sectional views. Weather permitting, this project will be worked on outside.

Modifications/Accommodations

I will review student's IEP, 504 or ELLIDEP and make appropriate modifications and accommodations.

In the event that a student must miss class, it is their responsibility to make up any missed work. On the class wiki, every class will have a descriptive overview of the lesson that was presented that day including any relevant notes, graphic organizers, and or/study guides. Students will have full access to the class wiki and will be able to keep up with any missed work. However, students should also communicate with me and/or a fellow classmate to get a full understanding of the missed material. Any missed assignments will be due within the following two classes. If an assignment was due the day that the student was absent, that assignment will be due at the beginning of the following class.

Extensions: Students will be using Floorplanner software.

Materials, Resources and Technology

- paper
- pencils/pens

- laptop/desktop access
- computer/projector
- graphic organizers
- Floorplanner account
- Class Wiki
- calculator
- textbook
- handouts
- further study resources

Source for Lesson Plan and Research

- Floorplanner Video - <http://www.youtube.com/watch?v=WS4E5nLKBbc&feature=related>
- The University of Chicago School Mathematics Project – Geometry: Integrated Mathematics 2nd Edition Copyright 2002 Prentice-Hall Inc.

Maine Standards for Initial Teacher Certification and Rationale

Standard 3 - Demonstrates a knowledge of the diverse ways in which students learn and develop by providing learning opportunities that support their intellectual, physical, emotional, social, and cultural development.

Rationale: This lesson provides diverse learning opportunities that support intellectual, physical, emotional, social, and cultural development. Students that have a "beach ball" type learning style, a style that requires a variety of resources, adaptive environment, choices of activities, spontaneity, and personal freedom, will be able to have their creativity flourish while creating their lesson product. Other students that need organization, structure, visual directions, sequential learning, clear procedures and expectations, such as "clipboards", will organize their information and use graphic organizers. They will also be describing, step-by-step, how and why they are solving problems while discussing their mathematical work, discussing their classmates' work, and while reflecting on their final product. The "microscope" type learners, who learn best by discovery learning, analyzing concepts, deep exploration, discussion, and focusing on details, will rediscover definitions, properties, and theorems that they can apply to solve problems. Students will also participate in one-on-one and class discussions. Students that have a "puppy" type learning style, a style that thrives in a comfortable environment, encouraging atmosphere, supportive grouping, empathic listeners, and sensitive peer, will participate comfortable and respectful one-on-one and class discussions, positive feedback from myself and peers.

Standard 4 - Plans instruction based upon knowledge of subject matter, students, curriculum goals, and learning and development theory.

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two-dimensional floor plan. The floor plans will be drawn to scale using the Floorplanner software. By understanding where mathematics is used in real world applications, students will accept the importance of mathematics.

Standard 5 - Understands and uses a variety of instructional strategies and appropriate technology to meet students' needs.

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Verbal: Students will be participating in group and class discussions, defending their art and mathematical work.

Visual: Students will analyze real world architecture by creating a geometrical representation using Floorplanner. They will use graphic organizers if necessary.

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Extensions: Students will be using Floorplanner software.

Standard 8 - Understands and uses a variety of formal and informal assessment strategies to evaluate and support the development of the learner.

Rationale:

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Teaching and Learning Sequence:

- Review Homework
- Review Previous Lesson/Answer Clarifying Questions
- Watch Floorplanner Video
- Discuss Architecture
 - What is architecture?
 - How is architecture art?
 - How does math relate to architecture?
 - What is a plane section?
- Groups
 - Draw top, side, & sectional view of 2 objects in the classroom.
- Individual
 - Draw your favorite room in your house, or create a room that you would want to have, using Floorplanner. Draw rooms surrounding your room to create an entire floor of a building. Be prepared to discuss your creation.

Content Notes

Reference:

- The University of Chicago School Mathematics Project – Geometry: Integrated Mathematics 2nd Edition Copyright 2002 Prentice-Hall Inc.

Handouts

Graphic Organizer: See Unit Graphic Organizers

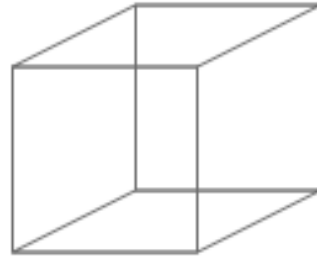
1 Dimension



2 Dimensions



3 Dimensions



THE MATH...

If you changed dimensions, what mathematical topics would change?

Directions: If you choose a 2-dimensional piece of art, write down how the mathematical topic would change if you transformed it into a 3-dimensional piece of art. If you choose a 3-dimensional piece of art, write down how the mathematical topic would change if you transformed it into a 2-dimensional piece of art.

Questions to ask yourself:

- What objects (if any) would change when transforming between dimensions?
- What are the relationships between dimensions?
- How will I use this to create my own 2- or 3-dimensional mathematical piece of art?

Examples: area \leftrightarrow volume, circle \leftrightarrow sphere, line \leftrightarrow plane, square \leftrightarrow cube, triangle \leftrightarrow tetrahedron, etc.

Mathematical Topic	Dimension 2	Dimension 3

Thoughts & Notes:



Mathematical Topic	Definition	Example